

Customer No.: 31561  
Application No.: 10/604,795  
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In The Abstract

An under-ball-metallurgy layer between a bonding pad on a chip and a solder bump made with tin-based material is provided. The under-ball-metallurgy layer at least includes an adhesion layer over the bonding pad, a nickel-vanadium layer over the adhesion layer, a wettable layer over the nickel-vanadium layer and a barrier layer over the wettable layer. The barrier layer prevents the penetration of nickel atoms from the nickel-vanadium layer and reacts with tin within the solder bump to form inter-metallic compound. This invention also provides an alternative under-ball-metallurgy layer that at least includes an adhesion layer over the bonding pad, a wettable layer over the adhesion layer and a nickel-vanadium layer over the wettable layer. The nickel within the nickel-vanadium layer may react with tin within the solder bump to form an inter-metallic compound.